

IN THE CLAIMS

1-6. (canceled)

7. (new) A method of manufacturing a multi-layer wiring circuit substrate, comprising:

providing a first metal layer having a first major surface with a patterned mask layer overlying and exposing first areas of said first major surface and covering second areas of said first major surface;

selectively etching said first metal layer in said first areas of said first major surface to reduce a thickness of said first metal layer in said etched first areas and to form protrusions in said second areas, said protrusions extending above said etched first areas;

forming an interlayer-insulating layer overlying said etched first areas of said first major surface, said interlayer-insulating layer having an inner surface confronting said etched first areas and an outer surface remote from said inner surface such that said protrusions extend through said interlayer-insulating layer and have ends exposed at said outer surface;

providing a second metal layer in conductive communication with said exposed ends of said protrusions;

selectively patterning said first metal layer from a second major surface of said first metal layer remote from said first major surface; and

selectively patterning said second metal layer from an exposed major surface of said second metal layer remote from said interlayer-insulating layer.

8. (new) The method as claimed in claim 7, wherein said steps of selectively patterning said first and second metal layers are performed simultaneously.

9. (new) The method as claimed in claim 7, wherein said step of selectively patterning said first metal layer is

performed at a different time from said step of patterning said second metal layer.

10. (new) The method as claimed in claim 7, further comprising coating said ends of said protrusions with a material including a conductor prior to forming said interlayer-insulating layer.

11. (new) The method as claimed in claim 10, wherein said step of coating said ends includes applying a metal to said ends.

12. (new) The method as claimed in claim 11, wherein at least one of gold or solder is applied to said ends.

13. (new) The method as claimed in claim 10, wherein said step of coating said ends includes applying one of a conductive paste or an anisotropic conductive film to said ends.

14. (new) The method as claimed in claim 7, further comprising roughening said exposed ends of said protrusions prior to said step of providing said second metal layer.

15. (new) The method as claimed in claim 14, wherein said step of roughening includes spray etching said ends of said protrusions after said step of selectively etching said first metal layer to form said protrusions.

16. (new) The method as claimed in claim 7, wherein said patterned mask layer includes individual mask patterns having diameters smaller than diameters of individual ones of said protrusions, such that said step of selectively etching produces protrusions having spear-like shape.

17. (new) The method as claimed in claim 7, further comprising removing said patterned mask layer and subsequently etching said protrusions to cause said protrusions to become spear-like in shape.

18. (new) The method as claimed in claim 7, wherein said step of selectively etching said protrusions includes forming protrusions having drum-like shape.

19. (new) The method as claimed in claim 7, further comprising removing unnecessary ones of said protrusions prior to completing said steps of selectively patterning said first and second metal layers, wherein said step of removing said unnecessary protrusions includes over-etching said unnecessary protrusions while preserving others of said protrusions.

20. (new) The method as claimed in claim 7, wherein said first and second metal layers include copper.